

**K-STSM-14.1.1-REVE-AE**  
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# **Facilities Handbook for Building AE**

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**FACILITIES HANDBOOK**  
**FOR**  
**BUILDING AE**

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## LIST OF ABBREVIATIONS AND ACRONYMS

The following abbreviations and acronyms are used in this handbook. A more comprehensive listing is contained in NASA Reference Publication 1059 Revised, *Space Transportation System and Associated Payloads: Glossary, Acronyms, and Abbreviations*.

45 SPW	45th Space Wing
A	ampere
ac	alternating current
BIØ	bi-phase
bps	bits per second
°C	degrees Celsius
CCAFS	Cape Canaveral Air Force Station
CCTV	closed circuit television
cm	centimeters
cont	control
CWA	clean work area
ELV	Expendable Launch Vehicle
ESA 60A	Explosive Safe Area 60A
°F	degrees Fahrenheit
f-c	foot-candle
ft	feet or foot
ft <sup>2</sup>	square feet
ft <sup>3</sup>	cubic feet
gal	gallon
GMIL	Spacecraft Tracking and Data Network Station
GN <sub>2</sub>	gaseous nitrogen
GSE	ground support equipment
HPF	hazardous processing facility
Hz	hertz
in	inch
kg	kilogram
kHz	kilohertz
kbps	kilobits per second
KSC	John F. Kennedy Space Center
L	liter
lb	pound
LC	launch complex
lm/m <sup>2</sup>	lumens/meters squared
LSSM	Launch Site Support Manager

**LIST OF ABBREVIATIONS AND ACRONYMS (continued)**

m	meter
m <sup>2</sup>	square meters
m <sup>3</sup>	cubic meters
MDC	Mission Director's Center
MHz	megahertz
min	minute
MOCS	Mission Operations Communications System
NASA	National Aeronautics and Space Administration
NRZ	non-return to zero
OIS	Operational Intercommunications System
PGOC	Payload Ground Operations Contract
PHSF	Payload Hazardous Servicing Facility
psig	pounds per square inch gage
RF	radio frequency
SAA	satellite accumulation area
SAEF-2	Spacecraft Assembly and Encapsulation Facility-2
TOPS	Transistorized Operational Phone System
V	volt
Vac	volts ac

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## FOREWORD

Launch site payload processing facilities are described in three levels of documentation. These levels and their purposes are:

- a. K-STSM-14.1, Launch Site Accommodations Handbook for Payloads - This document provides a brief summary of each facility and a general description of John F. Kennedy Space Center (KSC) launch and landing site operations.
- b. Facility Handbooks - Each handbook provides a narrative description of the facility and its systems. Also, general operating rules, regulations, and safety systems are discussed in these handbooks. Handbooks available are:

K-STSM-14.1.1	<i>Facilities Handbook for Building AE</i>
K-STSM-14.1.2	<i>Facilities Handbook for Building AO</i>
K-STSM-14.1.3	<i>Facilities Handbook for Building AM</i>
K-STSM-14.1.4	<i>Facilities Handbook for Hangar S</i>
K-STSM-14.1.6	<i>Facilities Handbook for Explosive Safe Area 60A</i>
K-STSM-14.1.7	<i>Facilities Handbook for Spacecraft Assembly and Encapsulation Facility Number 2</i>
K-STSM-14.1.8	<i>Facilities Handbook for Radioisotope Thermoelectric Generator Storage Building</i>
K-STSM-14.1.9	<i>Facilities Handbook for Life Sciences Support Facility Hangar L</i>
K-STSM-14.1.10	<i>*Payload Accommodations at the Rotating Service Structure</i>
K-STSM-14.1.12	<i>Facilities Handbook for Vertical Processing Facility</i>
K-STSM-14.1.13	<i>*Orbiter Processing Facility Payload Processing and Support Capabilities</i>
K-STSM-14.1.14	<i>*O&amp;C Building Payload Processing and Support Capabilities</i>
K-STSM-14.1.15	<i>Facilities Handbook for Payload Hazardous Servicing Facility</i>

These facility handbooks are not under configuration control; however, they will be reissued as necessary in order to maintain usefulness to customers in their planning for launch site processing of their payloads.

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\* These handbooks are titled differently because the facilities also serve functions other than payload support. Only the payload accommodations are described in these documents.

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- c. Standard Interface Documents (SID's) - These reference documents are intended to provide the payload-to-facility interface design details for these launch site payload processing facilities and ground support equipment (GSE):

SID 79K12170	<i>Payload Ground Transportation Canister</i>
SID 79K16210	<i>Vertical Processing Facility</i>
SID 79K16211	<i>Horizontal Processing Facility (O&amp;C Building)</i>
SID 79K17644	<i>Payload Strongback</i>
SID 79K18218	<i>Launch Pad 39A</i>
SID 79K28802	<i>Launch Pad 39B</i>
SID 79K18745	<i>Orbiter Processing Facility</i>
SID 79K24867	<i>Hangar L - Life Sciences Support Facility</i>
SID 82K00463	<i>Payload Environmental Transportation System Multiuse Container</i>
SID 82K00678	<i>Single Pallet Rotation Device</i>
SID 82K00760	<i>Space Station Processing Facility</i>
SID 82K03223	<i>Payload Spin Test Facility Replacement</i>

SID's are not available for all launch site payload processing facilities. In these cases, the facility handbooks must be used for design interface information and customers should ask for verification of any areas of concern. When SID's are available, they should be used as the official definition of the facility interfaces. There are some SID's for which there are no handbooks; e.g., the payload strongback and the Payload Environmental Transportation System (PETS) multiuse container. In these cases, the SID's must be used.

Customers may obtain copies of any of these documents through the assigned Launch Site Support Manager (LSSM).

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## **SECTION I**

### **INTRODUCTION**

#### **1.1 PURPOSE**

The purpose of this handbook is to provide basic information regarding payload processing and support capabilities in the Building AE Payload Processing Facility (PPF) on the Cape Canaveral Air Force Station (CCAFS). The facility and location are shown in figure 1-1.

The processing flow begins when a payload and its associated ground support equipment (GSE) arrive at a PPF. After receiving and inspection, final assembly or buildup of the payload to its launch configuration is initiated. This could include the installation of solar panels, antennas, and other items that were shipped separately to the launch site. This assembly does not include operations involving ordnance, cryogenics, or hypergols, but can include initial pressure system tests, propellant system leak tests, and payload functional testing with payload-unique ground checkout equipment. During this buildup phase, minor repairs are possible, and electrical and mechanical repair and fabrication facilities are available.

The John F. Kennedy Space Center (KSC) Launch Site Support Manager (LSSM) in conjunction with the Launch Site Support Team and the payload owner will determine launch site facility utilization assignments based on identified payload requirements and overall Space Shuttle schedules or National Aeronautics and Space Administration (NASA) purchased Expendable Vehicles schedules. The handbooks identified in the Foreword describe the configuration of the CCAFS and KSC off-line PPF's and hazardous processing facilities (HPF's) which are available to potential customers.

#### **1.2 SCOPE**

This handbook is intended to be used by the payload organizations as a guide for planning of payload activities in Building AE. It describes the capabilities and standardized interfaces of Building AE.

#### **1.3 CUSTOMER CHARGE**

Use of Building AE for payload processing is considered an optional service.

#### **1.4 FACILITY ACCOMMODATIONS**

The facility accommodations available to the customer as identified herein provide support to a variety of NASA and NASA customer payloads and may accommodate payload elements being processed simultaneously. The customer must remain cognizant during design development of the necessity to share these facilities with other payload elements. Individual payload customer requirements should be coordinated closely with the KSC LSSM to assure that support is available when needed.

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**Figure 1-1. KSC/CCAFS STS Payload Processing Facilities**

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Building AE is considered a customer-operated facility where the customer is responsible for day-to-day operations with exception of crane preoperation checks and door opening and closing. Crane preoperation checks are the responsibility of the USAF 45th Space Wing (45 SPW) and door openings and closings are normally handled by either 45 SPW or NASA personnel.

## **1.5 HAZARDOUS AND CONTROLLED WASTE**

In advance of their arrival, customers will fill out KSC Form 26-551, *Process Waste Questionnaire*, for any hazardous and controlled waste they expect to generate at KSC during processing. All waste generated at KSC will be managed in accordance with the requirements of KHB 8800.7, *Hazardous Waste Management*.

Once a customer has identified launch site waste generations, a satellite accumulation area (SAA) will be set up in facilities denoted as points of generation of these wastes.

These SAA's will be established in order to comply with the intent of the Resource and Recovery Act of 1976, which was established to institute a national program to control the generation, storage, transportation, treatment, and disposal of hazardous and controlled waste.

Customers should coordinate any waste operations or problems with their assigned LSSM. Regulations for the use of, control of, and disposal of waste at the launch site are strictly enforced.

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## SECTION II

### FACILITY DESCRIPTION

#### 2.1 LOCATION AND DESCRIPTION

Building AE (figure 2-1), Facility No. 60680, is on Hangar Road (figure 2-2) south of CCAFS Industry Road. The area is fenced, lighted, and guarded by a roving guard at night, on weekends, and on holidays.

**Figure 2-1. Building AE, CCAFS**

Building AE was acquired by NASA through a NASA/Department of Defense agreement. Extensive modifications have since expanded the payload checkout and test capabilities. The building has a rigid steel frame covered with corrugated aluminum and has overall dimensions of 36.6 meters (m) by 97.5 m (120 feet (ft) by 320 ft).

Two large antenna towers (one on the north side and one on the south side of the building) complete the facility.

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**Figure 2-2. Site Plan, Building AE**

## **2.2 PERSONNEL ACCESS**

A chainlink fence encircles Hangar S and Buildings AO, AM, and AE. The three gates in the fence are open during normal working/duty hours. A 12.2 m (40-ft) wide gate is in front of Building AE; a 12.2 m (40-ft) gate in front of Hangar S; and a 7.0 m (23-ft) gate between Buildings AM and AO. Vehicles and personnel may enter this area through any of these gates. The gates have no security guards during normal duty hours; therefore, security within each facility will be provided by USAF support contractor personnel as required by the payload organization/customer assigned in the facility. After 6:00 p.m. on weekdays and on weekends or holidays, all vehicles and personnel requiring non-duty hour access to any of these facilities must enter through the Building AE gate. Once inside the gate, vehicles and personnel have access to any of these four facilities by roadways which connect the facilities. Security within each hangar or building during non-duty hours will be provided by USAF support contractor personnel as required by the payload organization/customer assigned to the facility.

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## 2.3 FUNCTIONAL DIVISIONS

This facility is generally used for prelaunch preparations and checkout of unmanned payloads. The building contains a class 10,000 to 50,000 high bay clean room complex, an unmanned vehicle telemetry ground station, the Mission Director's Center (MDC), and offices for payload management and contractor personnel. The KSC Payload Management and Operations Directorate uses this building as its "communications center." The entire building is environmentally controlled.

Building AE is functionally divided into four major areas: the north wing, the central frame low bay, the high bay clean room complex, and the south wing. Two concrete masonry block walls run the complete east-west length of the building to separate the north wing, central frame low bay, and the south wing. An extra wide, wooden-stud, gypsum-covered wall separates the high bay clean room complex from the remainder of the building. Figure 2-3 illustrates Building AE's configuration, figure 2-4 provides the floor plan, and table 2-1 lists the available customer room sizes and functions.

Personnel and vehicles enter the Building AE fenced area through the 12.2 m (40-ft) wide gate on the east side. On the south side of the building, the traffic lane is restricted to 4.1 m (13 ft 6 inches (in) wide. No special badging requirements exist during normal operations except for the clean room complex, if a security guard has been posted.

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**Figure 2-3. Building AE Configuration**

**Figure 2-4. First Floor Plan, Building AE**

**Table 2-1. Customer's Room Schedule, Building AE**

Room No.	Length	Width	Ceiling Height	Largest Doorway	Floor	Walls	Ceiling	Function
<b>NORTH WING</b>								
102	7.97m (26'2")	4.14m (13'7")	3.05m (10'0")	0.91m x 2.03m (3'0" x 6'8")	Carpet	VS	ACST	Conference Room
114	8.66m (28'5")	8.26m (27'1")	3.05m (10'0")	1.77m x 2.03m (5'10" x 6'8")	Carpet	GWB	ACST	Office Areas
<b>CENTRAL FRAME LOW BAY</b>								
135	18.08m (59'4")	11.53m (37'10")	6.1m (20'0")	0.91m x 2.03m (3'0" x 6'8")	Carpet	GWB	Corr Steel	Office Area
135B	17.47m (57'4")	11.53m (37'10")	6.1m (20'0")	2.68m x 3.05m (8'10" x 10'10")	VAT	GWB	Coor Steel	Payload Ground Station/Equipment Area
<b>HIGH BAY CLEAN ROOM COMPLEX</b>								
118A	5.59m (18'4")	3.94m (12'11")	2.69m (8'10")	0.91m x 2.03m (3'0" x 6'8")	VAT	SW	VAT	Test Control Room
118B	3.89m (12'9")	2.51m (8'3")	3.05m (10'0")	0.91m x 2.13m (3'0" x 7'0")	VAT	GWB	GWB	Locker Room
120	2.74m (9'0")	1.22m (4'0")	2.44m (8'0")	0.76m x 2.11m (2'6" x 6'11")	VS	Metal	Metal	Airlock, Exit Only
120A	2.74m (9'0")	3.71m (12'2")	3.05m (10'0")	0.91m x 2.03m (3'0" x 6'8")	VS	GWB	GWB	Garment Change Room
122	2.74m (9'0")	1.22m (4'0")	2.44m (8'0")	0.81m x 2.44m (2'8" x 8'0")	VS	Metal	Metal	Personnel Entry Air Shower
124	8.67m (28'5-1/2")	6.5m (21'4")	3.05m (10'0")	2.46m x 2.16m (8'1" x 7'1")	VS	SW	VAT	Test and Storage Area
126	2.74m (9'0")	1.22m (4'0")	2.44m (8'0")	0.81m x 2.44m (2'8" x 8'0")	HC	GWB	GWB	Personnel Entry Air Shower
126B	2.74m (9'0")	1.22m (4'0")	2.44m (8'0")	0.76m x 2.11m (2'6" x 6'11")	HC	GWB	GWB	No Exit (Locked)
126C	4.78m (15'8")	4.14m (13'7")	2.74m (9'0")	0.91m x 2.13m (3'0" x 7'0")	HC	SW	VAT	Clean Room Equipment Storage
131	11.71m (38'5")	9.27m (30'5")	3.05m (10'0")	3.05m x 3.05m (10'0" x 10'0")	VS	SW	VAT	Payload Ground Station/Test and Storage Area
132	15.7m (51'6")	13.36m (43'10")	12.88m (42'3")	4.5m x 10.99m (14'9" x 36'1")	VS	SW	VAT	High Bay Test Area
133	10.06m (33'0")	5.18m (17'0")	12.19m (40'0")	4.5m x 10.99m (14'9" x 36'1")	VS	SW	VAT	High Bay Airlock
<b>SOUTH WING</b>								
101B	11.58m (38'0")	5.49m (18'1")	3.05m (10'0")	0.91m x 2.03m (3'0" x 6'8")	VAT	ACST	ACST	Observation Room
109A	11.58m (38'0")	7.01m (23'0")	3.05m (10'0")	0.91m x 2.03m (3'0" x 6'8")	VAT	ACST	ACST	MDC
LEGEND: ACST - Acoustical Tile Panels      SW - Steel & Wood Wallboard EM - Exposed Masonry - Painted      VAT - Vinyl Asbestos Tile GWB - Gypsum Wallboard      VS - Vinyl Sheet HC - Hardened Concrete								

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## 2.4 NORTH WING

The north wing is used primarily for offices. Most of this space is permanently assigned to NASA and the telemetry laboratory support contractor. The unshaded areas in figure 2-5 show space which is normally available for payload projects. Figure 2-6 shows selected office space. The AE Conference Room (room 102) may be reserved for use by contacting the NASA Facility Manager.

This wing is of standard architectural construction with tile-covered concrete floors, gypsum wallboard partitions, and 10 foot (3.1 m) high acoustical ceilings with drop fluorescent lighting. Office areas are carpeted and equipped with modular furniture.

**2.4.1 MACHINE SHOP.** A machine shop (room 110), is operated by CS-GSD-2C for local support of spacecraft assembly and checkout facilities and GSE (figure 2-5). It contains the following equipment: metal lathe, drill press, band saw, a table-mounted hand-operated bendbreaker and a table-mounted shearing machine. This shop area is serviced with heavy-duty electrical power and compressed air.

**Figure 2-5. North Wing, Building AE**

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**Figure 2-6. North Wing, Building AE, Office Furniture Layout**

## **2.5 CENTRAL FRAME LOW BAY**

The central frame low bay (shown in figure 2-7) contains a payload equipment area (room 135B) on the main floor and an office area (room 135) equipped with modular furniture. Equipment access to the low bay is through the double-doors at the southeast corner of the building and down the hallway to room 135B. The unshaded areas in figure 2-7 show space which is normally available to payload projects.

A mezzanine on the north side runs the length of the low bay and averages 4.6 m (15 ft) in width. The mezzanine is used for storage and data display and is available to customers only for data display.

The low bay is air-conditioned for personnel comfort and does not qualify as a clean room environment.

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**Figure 2-7. Central Frame Low Bay, Building AE**

The payload equipment area (room 135B) is 11.53 m by 17.47 m (37 ft 10 in wide by 57 ft 4 in long). The clear vertical height is 6.1 m (20 ft). This room has a 20 centimeters (cm) (8-in) raised modular floor for cables and air-conditioning ducts. This area is commonly used for setup of a payload ground station.

## **2.6 HIGH BAY CLEAN ROOM COMPLEX**

The high bay clean room complex is west of the north and south wings and the central frame low bay. The unshaded areas in figure 2-8 show space which is normally available to payload projects. Most of this area is comprised of clean work areas and supporting anterooms; the exceptions are room 129, a KSC engineering office, and room 118A, the high bay test control room. The door between room 129 and the high bay test area (room 132) has been permanently blocked. The high bay test area is rated as a class 10,000 clean work area (CWA). The high bay airlock (room 133), the test and storage areas (rooms 124 and 131), and the small equipment room (room 126C) are rated as class 50,000 CWA's.

### **NOTE**

All large pneumatically sealed equipment doors opening into/out of the CWA complex must be operated by CCAFS support contractor personnel.

Although customers establish and enforce their own clean work area procedures (i.e., wearing clean room garments) they must maintain basic clean room operating procedures. No smoking or eating in the CWA's should be permitted to assure that only normal janitorial service will be required before the CWA is available for the next customer.

**2.6.1 HIGH BAY AIRLOCK.** This airlock (room 133) is 5.2 m by 11.9 m (17 ft deep by 39 ft wide); however, usable floor area is reduced to 5.2 m by 10.1 m (17 ft by 33 ft) because of air filters on the north wall and the return air system grate on the south wall. The clear vertical height is 12.2 m (40 ft). Large equipment must enter the test area through this airlock. A manual crank operates both pneumatically-sealed doors. The doorways are 4.5 m by 11 m (14 ft 9 in wide and 36 ft 1 in high). This is a laminar flow room with air moving from north to south.

**2.6.2 HIGH BAY TEST AREA.** This area (room 132) has a usable floor space of 13.4 m by 15.7 m (43 ft 10 in by 51 ft 6 in) with a clear vertical height of 10.4 m (34 ft). Large equipment enters through the high bay airlock. Personnel and small equipment enter the room through small air showers (rooms 122 or 126). This is a laminar flow clean room with air moving from east to west.

**2.6.3 TEST AND STORAGE AREAS.** The usable floor space in room 131 is 9.3 m by 11.7 m (30 ft 5 in by 38 ft 5 in) with a clear ceiling height of 3.1 m (10 ft). An enclosed, 45.6 cm by 45.6 cm (18-in by 18-in), vertical structure support is in the center of the room. This room is accessible by two doors. The doorway into the high bay test area is 3.1 m by 3.1 m (10 ft by 10 ft) and has two 1.5 m (5-ft) wide swinging doors. A 0.9 m by 2.1 m (3-ft wide by 7-ft high) personnel door is in the south wall. This room is equipped to accommodate a payload ground station; in this mode, the doors into the high bay are locked.

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**Figure 2-8. High Bay Clean Room Complex, Building AE**

**2.6.4 CLEAN ROOM COMPLEX ANTEROOMS.** Anterooms servicing the high bay clean room complex are:

<u>Room No.</u>	<u>Name</u>
118A	Locker Room
118B	Clean Room Entrance
120	Airlock, Exit Only
120A	Garment Change Room
122	Personnel Entry Air Shower
126	Personnel Entry Air Shower
126B	Airlock, Exit Only

**2.6.5 TEST CONTROL ROOM.** The test control room (118A) is used by payload project personnel to observe and control testing. It is isolated from the clean work areas and environmentally controlled for personnel comfort. Usable floor space is 4 m by 7 m (13 ft by 23 ft); the clear ceiling height is 2.7 m (8 ft 10 in). A 1.2 m by 2.1 m (4-ft-high by 7-ft wide) window permits observation of activity in the east end of the high bay test area. This room can also be used, depending on heat load, for small quantities of payload GSE.

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## **2.7 SOUTH WING**

The south wing contains the MDC, the Launch Vehicle Data Center, the telemetry ground station and offices. These offices are occupied by the ground station staff and support contractor personnel. The ground station receives, monitors, and records telemetry signals during prelaunch checkout. This information is evaluated to determine the flight readiness of each vehicle. During launch and in the initial flight phase, the ground station receives and records launch vehicle real-time data for evaluation. Flight telemetry information is transmitted to the MDC for visual display.

The MDC was developed to provide Mission Directors and project staffs a central facility from which tests, mission simulations, and launch operations could be conducted. Fully equipped to perform these functions, the MDC occupies rooms 101B, 109, and 109A. Communications equipment room 109 supports the MDC and contains control, switching, and monitoring equipment used by the MDC. Room 109A, the Mission Operations Area, is the hub of all MDC activity. It provides the Mission Director and associated staff with a centralized communications and information source. Room 101B is the visitors viewing room, where project visitors can view operations in the Mission Operations Area. Seating arrangements in the MDC are coordinated through the LSSM. For more information on the MDC, contact your LSSM.

**RELEASED**

## SECTION III

### MECHANICAL SYSTEMS

#### 3.1 NORTH WING

**3.1.1 ENVIRONMENTAL CONTROL.** The north wing is air-conditioned for personnel comfort only. The air-conditioning system is designed to maintain  $21.7 \pm 3.3$  degrees Celsius ( $^{\circ}\text{C}$ )  $71 \pm 6$  degrees Fahrenheit ( $^{\circ}\text{F}$ ) with a relative humidity of 50 percent or less.

**3.1.2 FIRE PROTECTION.** Most rooms in the north wing have fire detectors connected to an automatic signaling device. When activated, this device sends a coded signal to the CCAFS Industrial Area Fire Station and also sounds the fire alarm bells in the building. Hand-operated fire alarms, which activate the same coded signal and bells, are throughout this wing.

The fire control equipment includes personnel-operated, portable water-filled fire extinguishers and a firehose in the main hallway. The 9.5 liter (L) (2 1/2 gallon (gal)),  $\text{GN}_2$ -pressurized, water-filled fire extinguishers are for class A fires. The 22.9 m (75-ft) firehose is rated at 246 L/minute (min) (L/min) (65 gal/min).

#### 3.2 CENTRAL FRAME LOW BAY

**3.2.1 MATERIAL HANDLING EQUIPMENT.** The equipment in this area consists of a bridge crane in the low bay (room 135). This equipment may be operated only by trained personnel. The 45 SPW contractor support personnel will provide crane training for payload organizations as required in accordance with Kennedy Management Instruction 6430.4, *Examination and Licensing of KSC Facility Crane Operators*. Physical examinations are a prerequisite to crane training.

**3.2.1.1 Low Bay Bridge Crane.** The rails for this 1.8 metric ton (2-ton) bridge crane are installed in an east-west direction. Effective east-west travel of the bridge crane (hook centerline to wall) is 1.8 m (6 feet) from the east wall to 2.3 m (7 ft 6 in) from the west wall. In terms of centerline of building to centerline of hook, the bridge crane's north-south travel is 6.1 m (20 ft) north and 5.6 m (18 ft 6 in) south. Vertical hook travel is from 8.6 cm (3-3/8 in) to 6.2 m (20 ft 5 in) above the floor. The lift hook, which is equipped with a safety latch, will accept up to a 3.3 cm (1-9/32 in) cable. Low bay obstructions to crane operations will only permit operation of the crane east or west of room 137. (The lift hook can be transversed unloaded over room 137 and the adjacent enclosed hallway.)

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The material handling equipment speeds are:

	<u>Low</u>	<u>High</u>
Bridge Crane	2.9 m/min (9.5 ft/min)	15.2 m/min (50 ft/min)
Trolley	3.4 m/min (11.1 ft/min)	21.0 m/min (69.0 ft/min)
Hoist	0.8 m/min (2.5 ft/min)	4.7 m/min (15.5 ft/min)

**3.2.2 COMPRESSED AIR.** Unfiltered, adjustable compressed air outlets are located in the southwest corner of the low bay. The system outlets are designed for 6.9 bars (100 pounds per square inch gage (psig)) 0.7 m<sup>3</sup>/min (25 cubic feet (ft<sup>3</sup>) per min) with a quick-disconnect socket equal to Hansen series 3HK.

**3.2.3 ENVIRONMENTAL CONTROL.** The low bay area has an air-conditioning system designed to provide  $21.7 \pm 3.3$  °C ( $71 \pm 6$  °F) with a relative humidity of 50 percent or less.

**3.2.4 FIRE PROTECTION.** The low bay has fire detectors connected to an automatic signaling device. When activated, this device sends a coded signal to the CCAFS Industrial Area Fire Station and sounds the fire alarm bells in the building. Hand-operated fire alarm boxes activate the same coded signal and alarm bells.

Wall-mounted, portable, water-filled fire extinguishers and one CO<sub>2</sub>-filled fire extinguisher are located throughout the low bay. The 9.5 L (2 1/2 gal), GN<sub>2</sub>-pressurized, water-filled units are for class A fires and the 2.7 kg (6-pound), squeeze-lever actuated CO<sub>2</sub> fire extinguisher is for class B and C fires. A 22.9 m (75-ft), 246 L/min (65 gal/min), water-fed firehose is on a rack on the south wall. A similar firehose in the hallway adjoining the north wall can also be used.

### **3.3 HIGH BAY CLEAN ROOM COMPLEX**

**3.3.1 MATERIAL HANDLING EQUIPMENT.** The material handling equipment in this complex consists of bridge and monorail cranes in the test area and a monorail crane in the airlock. See table 3-1 for the crane specifications.

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**Table 3-1. High Bay Crane Specifications, Building AE**

**3.3.1.1     Airlock Monorail Crane.** The rail of this 5.4 metric ton (6-ton) crane is in a north-south travel of the crane (hook centerline to wall) is 2.3 m (7 ft 6 in) from the north wall to 1.4 m (4 ft 6 in) from the south wall. Vertical hook travel is 0.0 m (0 in) to 11.7 m (38 ft 5 in) above the floor.

**3.3.1.2     Test Area Monorail Crane.** The rail of this 1.8 metric ton (2-ton) crane is in a north-south direction on the centerline of the door into the test and storage area, room 131. The maximum north-south travel is 0.6 m (2 ft) from the south wall to 1.4 m (4 ft 6 in) from the north wall of the test area. Vertical hook travel is 0.1 m (4 in) to 11.8 m (38 ft 10 in) above the floor.

**3.3.1.3     Test Area Bridge Crane.** The rails for this 4.5 metric ton (5-ton) bridge crane are in an east-west direction. Effective east-west travel of the bridge crane (hook centerline to wall) is 2.4 m (8 ft) from the east wall to 3.7 m (12 ft) from the west wall return-air grille. Its north-south travel (hook centerline to wall) is 1.2 m (4 ft) from the north wall to 0.8 m (2 ft 6 in) from the south wall. Vertical hook travel is 0.1 m (4 in) to 10.3 m (33 ft 9 in) above the floor.

**3.3.2        COMPRESSED AIR.** Regulated compressed air is available to all equipment and payload operational areas in the high bay clean room complex. The system has a 5-micron filter at each outlet. Outlets are designed to operate 6.9 bars (100 psig)/0.7 m<sup>3</sup>/min (25 ft<sup>3</sup>/min). The quick-disconnect sockets are equal to Hansen series 3HK sockets.

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**3.3.3 GASEOUS NITROGEN (GN<sub>2</sub>).** Building AE does not have built in GN<sub>2</sub> storage capability. However, depending on customer requirements, portable tube banks may be located in two locations; the southeast corner of room 131, where a passageway is located for gas and electrical needs, and on the corner of room 126A.

A distribution panel, located outside door 126A on the northwest corner of the building, is tied to a floor mounted reducing panel near the west wall of room 124 with two 0.32 cm (1/4-in) outlet hand valves and a 206.9 bars (3000 psig) gage indicating available delivery pressure which can be regulated from 0-165.5 bars (0-2400 psig).

**3.3.4 VACUUM SYSTEM.** All clean rooms are serviced with a vacuum system for cleaning purposes. The system equipment and control panels are in room 128.

**3.3.5 ENVIRONMENTAL CONTROL SYSTEM.** The high bay test area is rated a class 10,000 clean work area. The remaining clean work areas and the airlock are class 50,000. The five rooms conform to Federal Specification 209A.

Temperature is controlled at  $21.7 \pm 3.3$  °C ( $71 \pm 6$  °F) with a relative humidity of 50 percent or less. The high efficiency filters are capable of removing 99.97 percent of all airborne particulate matter over 0.3 micron in diameter. The high bay airlock and the test area are horizontal laminar flow clean rooms. The other rooms have conventional flow air distribution from ceiling mounted diffusers. Past experience indicates that this complex can maintain a class 10,000 rating if stringent personnel and operational control is exercised.

**3.3.6 CONTAMINATION CONTROL AND MONITORING SYSTEM.** An Environmental Monitoring System, consisting of a continuous data logger and a set of sensors for monitoring particle count, temperature, humidity, and positive pressure is located in the east corner of the high bay test area. An identical set of sensors is mounted on the west wall. The monitor and mainframe for the system is located in room 118A. The data logger is visible through the observation window of this room.

The high resolution particle counter can count and size airborne particles from 0.3 microns to 20 microns at a concentration limit of  $2 \times 10^6$  particles per cubic foot, providing real-time and historical data necessary to maintain a clean working environment (see table 3-2 for cleanliness requirements).

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**Table 3-2. Cleanliness Requirements [1]**

Clean Work Area Levels		Level #2	Level #3
Parameter	Air Flow	Laminar	Non-Laminar
Maximum Airborne Particle Counts (Per Cubic Foot)	Req $\geq 0.5 \mu\text{m}$	10,000	50,000
	Req $\geq 5.0 \mu\text{m}$	65	300
	Monitoring	Continuous	Continuous
Temperature ( $^{\circ}\text{F}$ ) [3]	Requirement	$71 \pm 6$	$71 \pm 6$
	Monitoring	Continuous	Continuous
Relative Humidity (Percent) [3]	Requirement	50 Max	50 Max
	Monitoring	Continuous	Continuous
Maximum Particle Fallout [2]	Goal	Level 200	Level 300
	Monitoring	Continuous	Continuous
Maximum NVR (mg/0.1m <sup>2</sup> /month)	Requirement	1.0	1.0
	Monitoring	Continuous	Continuous
Maximum Volatile Hydrocarbons (ppm) (v/v)	Requirement	15	15
	Monitoring	Every 2 Weeks	Every 2 Weeks
Minimum Positive Pressure	Requirement	0.05 in. H <sub>2</sub> O	0.05 in H <sub>2</sub> O
	Monitoring	Daily	Daily
Minimum Air Changes	Requirement	20/Hour	6/Hour
[1] During Periods of Operation [2] Levels Per MIL-STD-1246 for a 24-Hour Period [3] Program OMRSD May Supersede These Requirements			

**3.3.7 FIRE PROTECTION.** All rooms in the high bay clean room complex have fire detectors connected to an automatic signaling device. When activated, this device sends a coded signal to the CCAFS Industrial Area Fire Station and sounds the fire alarm bells in the building. Smoke detectors are located in the high bay area air conditioning ducts, which, when activated, shut down the air handlers and send a coded signal to the CCAFS Industrial Area Fire Station. The clean room complex is not equipped with fire alarm boxes.

The high bay test area has two enclosed firehose racks, each with 22.9 m (75 ft) of hose rated at 246 L/min (65 gal/min) and each rack also contains a portable 2.7 kg (5-pound) CO<sub>2</sub>-filled fire extinguisher. Another 2.7 kg (5-pound) CO<sub>2</sub>-filled fire extinguisher is located in room 131, leading into the high bay. See figure 3-1 for locations of this equipment.

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**Figure 3-1. High Bay Mechanical Systems, Building AE**

## SECTION IV

### ELECTRICAL SYSTEMS

#### 4.1 NORTH WING

**4.1.1 ELECTRICAL POWER.** Office space used by payload project groups has 120-volt (V), 15-ampere (A), single-phase, alternating current (ac) electrical power.

**4.1.2 ILLUMINATION.** Standard fluorescent lighting fixtures suspended from the ceilings provide illumination for the office areas and the hallways. The lighting intensity in the offices ranges from 968.8 to 1076.4 lumens/meters squared ( $\text{lm}/\text{m}^2$ ) (90 to 100 foot-candles(f-c)). Battery-operated, emergency lighting units are installed in the hallways.

#### 4.2 CENTRAL FRAME LOW BAY

**4.2.1 ELECTRICAL POWER.** The ac electrical power available in the low bay is:

	<u>Voltage</u>	<u>Amperage</u>	<u>Phase</u>	<u>Type Receptacle</u>
a.	120	15	single	standard duplex
b.	120	20	single	standard duplex
c.	120/208	30	three	RussellStoll 3114W
d.	120/208	60	three	RussellStoll 3124W
e.	120/208	100	three	RussellStoll 3134W

The payload telemetry ground station, the MDC, and the telemetry laboratory are connected to a permanently installed emergency generator outside the west end of Building AE. The changeover to this generator is manual. The minimum lapse time is approximately 30 seconds for the changeover and power stabilization. The emergency generator provides 350 kilowatts at 440 volts/60 Hertz (Hz).

**4.2.2 ILLUMINATION.** The low bay has suspended, standard fluorescent lighting fixtures. Lighting intensity is  $322.9 \text{ lm}/\text{m}^2$  (30 f-c) in the airlock and receiving inspection area and  $645 \text{ lm}/\text{m}^2$  (60 f-c) in remaining areas of the low bay. These fixtures are not radio frequency (RF) suppressed.

Battery-operated emergency lights, which operate automatically if industrial power fails, are located throughout the low bay.

**4.2.3 GROUNDING.** Eighteen, floor-recessed, instrumentation grounding receptacles are located in the low bay. Some of these receptacles are presently covered by a raised floor in room 135B.

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### 4.3 HIGH BAY CLEAN ROOM COMPLEX

**4.3.1 ELECTRICAL POWER.** The ac electrical power available in the high bay clean work area complex is:

	<u>Voltage</u>	<u>Amperage</u>	<u>Phase</u>	<u>Type Receptacle</u>
a.	120	15	single	standard duplex
b.	120	20	single	standard duplex
c.	120/208	30	single	RussellStoll 3113
d.	120/208	30	three	RussellStoll 3114W
e.	120/208	60	three	RussellStoll 3124W
f.	120/208	100	three	RussellStoll 3134W
g.	480	30	three	RussellStoll 7314
h.	480	60	three	RussellStoll 3124WR

The circuit breaker panels servicing this complex are outside the clean rooms. Some circuit breaker panels can be connected to a portable emergency power unit. These units are brought in only when the customer specifies a standby power requirement or in the event of an extended industrial power failure. Unless emergency power units have been placed in standby position, the time required to provide emergency power could be lengthy. The changeover from industrial power to emergency power will be performed manually.

**4.3.2 ILLUMINATION.** The high bay clean work area complex has flush, ceiling-mounted, fluorescent light fixtures. Light intensity for all rooms is 1076.4 lm/m<sup>2</sup> (100 f-c).

Battery-operated, emergency lighting units in the high bay test area automatically provide minimum illumination if the industrial power fails.

**4.3.3 GROUNDING.** Floor-recessed, instrumentation grounding receptacles are in the airlock, the high bay test area, and the test and storage areas. The test control room (outside of the clean work area) has a wall-mounted, insulated standoff, copper bus grounding bar interconnected to the main grounding system. The entire grounding system has a resistance rating within the 1-ohm standard requirement.

**4.3.4 BULKHEAD PLATE.** A 0.6 cm (1/4-in) thick aluminum instrumentation bulkhead plate connects the test control room 118A and the high bay test area. This 0.6 m by 2.0 m (2-ft by 6-ft 7 in) plate is on the wall beneath the observation window.

**4.3.5 PAYLOAD GROUND STATION AREAS.** Rooms 131 and 135B can be used as payload ground station areas. Cabling from room 131 providing closed circuit television (CCTV) communications, data lines, RF connections, and other necessary hookups can be run directly into the clean work area through a connecting doorway. Similar cabling from room 135B can be routed directly into the clean work area through a cableway provided under the raised floors in rooms 135B and 135C.

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## SECTION V

### COMMUNICATIONS AND DATA HANDLING

#### 5.1 COMMUNICATIONS

The following communications systems exist for payload processing requirements. The payload LSSM should be contacted for current communications capabilities.

**5.1.1 INTERCOMMUNICATIONS SYSTEM.** The voice communications on CCAFS use the Transistorized Operational Phone System (TOPS). On KSC, the Operational Intercommunications System (OIS) is used. When necessary, these two systems can be connected to permit voice communications between the two areas. The Mission Operations Communications System (MOCS) is used in the Building AE MDC. The MOCS is an integrated communications system for TOPS, the green phone network, and for administrative phones. Each console has 10 point-to-point green phones, 20 TOPS, 6 network circuits, and 4 telephone circuits. Figures 5-1 and 5-2 indicate most TOPS and MOCS unit locations in Building AE. The TOPS is a 20-channel system with certain channels reserved primarily for payload operations. The OIS is a multi-channel communications system used on KSC to provide communication throughout the KSC industrial and Launch Complex (LC)-39 areas. Certain OIS channels will also be reserved primarily for payload operations. The intercommunications system may only be operated by trained payload organization/customer personnel. Training will be provided by Payload Ground Operations Contract (PGOC) personnel.

**5.1.2 CLOSED CIRCUIT TELEVISION (CCTV).** The CCTV provides video surveillance of payload processing from operational areas to control areas in Building AE. Areas under surveillance of the CCTV cameras in Building AE include rooms 109A and 135. Figures 5-1 and 5-2 show the CCTV camera and the monitor capability locations in Building AE. The CCTV can also be provided from other PPF's, the HPF's, LC-17, LC-36, and the LC-39 Payload Changeout Room to Building AE.

**5.1.3 POINT-TO-POINT COMMUNICATIONS.** Point-to-point communications via green phones are provided to:

- |            |                      |         |
|------------|----------------------|---------|
| • MDC      | • VPF                | • LC-39 |
| • Building | • Building AM        | • LC-17 |
| • LC-36    | • O&C (Payload Comm) |         |

**5.1.4 MISCELLANEOUS.** The other forms of communication located in Building AE include administrative telephones, a public address system with an aural warning device, and a teletype station located in room 137D.

#### 5.2 DATA TRANSMISSION SYSTEMS

The data transmission systems include the wideband transmission system, the digital data transmission system, and the RF transmission system. These systems provide the capability for transmitting data between the KSC and CCAFS facilities involved in assembly, checkout, and integration of payloads. The capability exists to interface these systems with NASCOM and/or common carrier communications to provide communication with off-site facilities.

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**Figure 5-1. TOPS and CCTV Locations, West End, Building AE**

**Figure 5-2. TOPS and CCTV Locations East End, Building AE**

**5.2.1 WIDEBAND TRANSMISSION SYSTEM.** The wideband transmission system is a telecommunication system providing closed-circuit transmission of complex waveform electromagnetic signals within the 30-Hz to 4.5-MegaHertz (MHz) frequency spectrum at 1.0 Volts peak-to-peak  $\pm 0.2$  terminated into a 124 ohms balanced load. These signals include television video information, weather information, automated payload checkout and surveillance monitoring information, telemetry and data display information, high-density OIS, multiplex telecommunication carriers, timing distribution, and system/event command and response display data. Other analog and digital data associated with aerospace vehicular checkout, launch preparation, and postlanding equipment performance interrogations are also included.

Wideband transmission between 30-Hz to 4.5-MHz signals is available between Building AE's main communications room and the XY Building.\* These lines are then routed to all KSC/CCAFS major operating/support sites and to other NASA centers. The lines are twisted-shielded pairs with a nominal impedance of 124 ohms. Extension line outlets within Building AE are placed as required.

**5.2.2 DIGITAL TRANSMISSION SYSTEM.** The digital transmission system provides a balanced voltage, digital interface which is compatible with the Electrical Industries Association Standard RS-422 and RS-423. The system provides data circuits for transmission of asynchronous digital signals (such as telemetry and computer information) with bit rates between 100 bits per second and 256 kilo bits (kbps) per second in non-return to zero (NRZ)-L format (128 kbps maximum in BIØ-L format) between selected facilities at KSC and CCAFS

**5.2.3 RERADIATING ANTENNA SYSTEM.** Building AE provides roof-top antennas for radiating C-band, Ku-band, S-band, and ultra-high frequencies to other facilities as indicated in table 5-1. These systems are used to transmit or receive high rate uplinks or downlinks. Also, several runs of RG 214/RG-8 coaxial cable for very-high frequency (no antenna) are between the roof and the main communications room. (Reference KCS-HB-0004.0, *Payload Antenna Repeater System User's Planning Guide*.)

**Table 5-1. RF Capability for Building AE**

BAND	NO. LINKS	INTERFACE
C	2	LC-39A, LC-39B, Vertical Processing Facility (VPF), Explosive Safe Area 60A (ESA 60A), Payload Hazardous Servicing Facility (PHSF), PHSF Control (CONT), Spacecraft Assembly and Encapsulation Facility-2 (SAEF-2), and SAEF-2 CONT.
Ku	2	LC-39A, LC-39B, VPF, ESA 60A, Spacecraft Tracking and Data Network Station (GMIL), PHSF, PHSF CONT, SAEF-2, and SAEF-2 CONT
S	2	LC-39A, LC-39B, VPF, ESA 60A, GMIL, PHSF, PHSF CONT, SAEF-2, and SAEF-2 CONT

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\* The XY Building is the terminal and distribution facility for all cabling on the CCAFS.

**SECTION VI**  
**FACILITY DESCRIPTION SUMMARY,**  
**BUILDING AE**

**6.1 SAFETY**

- a. Automatic fire detection
- b. Personnel-operated fire extinguishers
- c. Personnel-operated firehoses
- d. Hand-operated fire alarm boxes

**6.2 FLOOR SPACE**

- a. North Wing  
Office space 71.2 m<sup>2</sup> (766.5 ft<sup>2</sup>)
- b. Central Frame Low Bay
  - (1) Receiving inspection area (room 135A) 5.8 m x 11.6 m  
(18 ft 11 in x 38 ft)
  - (2) Payload equipment area (room 135B) 11.5 m x 18.1 m  
(37 ft 10 in x 59 ft 4 in)
- c. High Bay Clean Work Area Complex
  - (1) High bay airlock (room 133) 5.2 m x 10.1 m  
(17 ft x 33 ft)
  - (2) High bay test area (room 132) 13.4 m x 15.7 m  
(43 ft 10 in x 51 ft 6 in)
  - (3) Test and storage areas
    - (a) Room 131 9.3 m x 11.7 m  
(30 ft 5 in x 38 ft 5 in)
    - (b) Room 124 6.5 m x 8.7 m  
(21 ft 4 in x 28 ft 5-1/2 in)

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- |     |  |  |
|-----|--|--|
| (4) | Small equipment cleaning area: (Room 126C) | 4.1 m x 4.8 m<br>(13 ft 7 in x 15 ft 8 in) |
| (5) | Test control room:<br>(Room 118A)          | 3.9 m x 5.6 m<br>(12 ft x 18 ft 4 in)      |
- d. South Wing  
Not available to payload projects

### 6.3 CEILING HEIGHTS (CLEAR)

- a. North Wing
- |     |              |               |
|-----|--------------|---------------|
| (1) | Office space | 3.1 m (10 ft) |
| (2) | Machine shop | 3.1 m (10 ft) |
- b. Central Frame Low Bay
- |     |                        |               |
|-----|------------------------|---------------|
| (1) | Storage area           | 2.4 m (8 ft)  |
| (2) | Payload equipment area | 6.1 m (20 ft) |
- c. High Bay Clean Room Complex
- |     |                                    |                     |
|-----|------------------------------------|---------------------|
| (1) | High bay airlock                   | 12.2 m (40 ft)      |
| (2) | High bay test area                 | 12.9 m (42 ft 3 in) |
| (3) | Test and storage areas<br>Room 131 | 3.1 m (10 ft)       |
- d. South Wing  
Not available to payload projects.

### 6.4 EQUIPMENT ENTRY (CLEAR)

- a. Central Frame Low Bay
- |     |   |  |
|-----|---|--|
| (1) | Staging area                              | 4.9 m wide x 4.9 m high<br>(16 ft x 16 ft)       |
| (2) | Staging area to receiving inspection area | 3.7 m wide x 3.6 m high<br>(12 ft x 11 ft 11 in) |
| (3) | Payload equipment area<br>(north wall)    | 2.4 m wide x 3.1 m high<br>(8 ft x 10 ft)        |

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## b. High Bay Clean Work Area Complex

- |     |   |   |
|-----|---|---|
| (1) | High bay airlock  | 4.5 m wide x 11 m high<br>(14 ft 9 in x 36 ft 1 in) |
| (2) | High bay test area<br>(through high bay airlock)              | 4.5 m wide x 11 m high<br>(14 ft 9 in x 36 ft 1 in) |
| (3) | Payload Ground Station<br>Room 131 into high bay<br>test area | 3.1 m wide x 3.1 m high<br>(10 ft x 10 ft)          |
| (4) | Test and storage areas  |   |
|     | (a) Room 131 south wall                                       | 0.9 m wide x 2.1 m high<br>(3 ft x 7 ft)            |
|     | (b) Room 124 into high<br>bay test area                       | 2.5 m wide x 2.2 m high<br>(8 ft 1 in x 7 ft 1 in)  |

**6.5 CRANES/HOISTS**

## a. Central Frame Low Bay

Low bay	One 1.8 metric ton crane (2-ton bridge)
---------	--

## b. High Bay

- |     |           |  |
|-----|-----------|--|
| (1) | Airlock   | One 5.4 metric ton crane<br>(6-ton monorail) |
| (2) | Test area | One 1.8 metric ton crane<br>(2-ton monorail) |
|     |           | One 4.5 metric ton crane<br>(5-ton bridge)   |

**6.6 MAXIMUM HOOK HEIGHTS**

## a. Central Frame Low Bay

Low bay	6.2 m (20 ft 5 in)
---------	--------------------

## b. High Bay

- |     |         |                     |
|-----|---------|---------------------|
| (1) | Airlock | 11.7 m (38 ft 5 in) |
|-----|---------|---------------------|

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- (2) Test area
  - (a) 1.8 metric ton monorail 11.8 m (38 ft 10 in)
  - (b) 4.5 metric ton bridge 10.3 m (33 ft 9 in)

## 6.7 SYSTEMS/EQUIPMENT

- a. Pneumatics
  - Compressed air at 6.9 bars (100 psig) in low bay and high bay
  - GN<sub>2</sub> at 0-165.5 bars (0-2400 psig) in high bay
- b. Vacuum System
  - All high bay clean rooms

## 6.8 TEMPERATURE/HUMIDITY

- a. High Bay
  - 21.7 ± 3.3 °C (71 ± 6 °F)/50% or less
- b. Low Bay and North Wing
  - 21.7 ± 3.3 °C (71 ± 6 °F)/50% or less

## 6.9 CLEANLINESS SPECIFICATIONS

- High Bay Airlock and Test Area
  - Air at outlet of HEPA filters is class 10,000. The remaining clean work areas are class 50,000

## 6.10 ELECTRICAL POWER

- a. All Facilities
  - 120-Volts ac (Vac)/15-A/1-phase
- b. Low Bay
  - 120-Vac/20-A/1-phase
  - 120/208-Vac/30-A/3-phase
  - 120/208-Vac/60-A/3-phase
  - 120/208-Vac/100-A/3-phase
- c. High Bay
  - 120-Vac/20-A/1-phase
  - 120/208-Vac/30-A/1-phase
  - 120/208-Vac/60-A/3-phase
  - 480-Vac/30-A/3-phase
  - 480-Vac/60-A/3-phase

RELEASED

**6.11 ILLUMINATION**

- a. North Wing 968.8 to 1076.4 lm/m<sup>2</sup>  
(90-100 f-c)
- b. Central Frame Low Bay 322.9 to 1076.4 lm/m<sup>2</sup>  
(30-100 f-c)

**6.12 COMMUNICATIONS**

- a. Telephones
  - (1) Administrative Commercial telephone service
  - (2) Green Phones To MDC, AO, AM, VPF, LC-39  
LC-17, and LC-36
- b. TOPS Transmit and receive from  
LC-17, LC-36, LC-39,  
CCAFS Industrial Area, and  
KSC Industrial Area
- c. MOCS Integrates the administrative,  
green phone, and TOPS systems
- d. Public Address All operational areas. Aural  
warning device overriding micro-  
phone input
- e. Teletype Room 137D

**6.13 DATA TRANSMISSION**

- a. Wideband Transmission System
  - (1) Frequency 30 Hz to 4.5 MHz
  - (2) Capability TV video, telemetry, data  
display, weather, and automated  
payload checkout and surveillance  
monitoring information; multiplex  
telecommunications carriers; high  
density OIS; timing distribution;  
system/event command and response  
display data.

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- b. Digital Transmission Capability
  - 100 bps-256 kbps in NRZ-L format
  - 128 kbps maximum in BIØ-L format
- c. Radiating System
  - (1) C band to
    - LC-39A, LC-39B, VPF, ESA 60A, LC-36B, PHSF, PHSF CONT, SAEF-2, and SAEF-2 CONT
  - (2) Ku-band to
    - LC-39A, LC-39B, VPF, ESA 60A, GMIL, PHSF, PHSF CONT, SAEF-2, and SAEF-2 CONT
  - (3) S-band to
    - LC-39A, LC-39B, VPF, ESA 60A, GMIL, PHSF, PHSF CONT, SAEF-2, and SAEF-2 CONT
  - (4) VHF
    - Coaxial cable between the roof and the main communications room, no antenna.

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